MedPlus Proposal

Arkansas Health Information Exchange (ARHIE)

Request for Information

May 7, 2010

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May 7, 2010

Ms. Alison Nicholas
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Ms. Nicholas,

MedPlus, Inc., and our partner Deloitte Consulting LLP (Deloitte), recognize that the State Health Alliance for Records Exchange (SHARE) is undertaking a highly critical and visible initiative that touches the lives of individuals living and working within Arkansas. Accordingly, we are very pleased to have the opportunity to submit our Proposal to deliver the solutions identified in the revised Request for Information (RFI) dated April 27, 2010.

MedPlus, headquartered in Mason, Ohio, is the healthcare information technology (HIT) subsidiary of Quest Diagnostics, Inc. MedPlus focuses on developing and supporting clinical and administrative applications by providing solutions that deliver value to physician practices, hospitals, integrated delivery networks (IDNs), community Regional Health Information Organizations (RHIOs) and Health Information Exchanges (HIEs).

Deloitte is one of the nation's oldest and most respected professional services firms. Their parent company was founded in 1895, and has since undergone many changes. Today Deloitte is the largest privately held professional services firm in the United States, providing audit, tax, consulting, and financial advisory services. Deloitte is a full-service consulting firm with a depth and breadth of knowledge in HIT, HIE and electronic health records (EHR) systems planning and implementation and healthcare quality improvement.

The SHARE vision is to acquire an HIE tool to provide a membership-wide system to coordinate and offer access to accurate and timely patient information. MedPlus and Deloitte have collaborated together on similar engagements and have the requisite expertise and experience to ensure the successful development, implementation and operation of the HIE infrastructure requested by SHARE. We will leverage our collective domain expertise, including a joint (MedPlus-Deloitte) HIE development project underway in the District of Columbia, to provide these services to SHARE.

From a partnership perspective, it is anticipated that MedPlus will provide the software, hardware and certain implementation services for this engagement. As we have done with similar type engagements, we will have Deloitte serve as a subcontractor, responsible for certain integration, project management and consulting responsibilities delivered in conjunction with our MedPlus Professional Services organization. Deloitte brings deep experience in healthcare – operations improvement, clinician adoption and change management, and information technology (including EMR/EHR and HIE). This experience is across the commercial (Provider and Health Plans), State and Federal healthcare landscape. In the Federal arena, Deloitte is providing significant support and consulting services to the Office of the National Coordinator (ONC).

As noted later in our response, we will propose to use the proven Deloitte HIE methodology to guide our Build, Design, Implementation and Operations approach. This methodology offers SHARE the ability to leverage Deloitte's proprietary financial sustainability models to enhance the probability for long-term operational and financial viability. We believe that Deloitte's service and delivery assets, combined with MedPlus' superior technology and clinical domain expertise represents a winning value proposition for SHARE. Specific information regarding MedPlus and Deloitte, including client installations, is included elsewhere in this proposal.

Experience

Our team understands the numerous aspects of large healthcare initiatives from both a technical and business perspective. Some of this experience is directly related to HIE efforts; others are related to projects involving the processes and technologies of healthcare entities which must be understood and are relevant to the development of an HIE business and technology architecture. Our breadth and depth of experiences with HIE and with HIT planning and implementation projects, our understanding of both commercial and public healthcare, and our knowledge of the healthcare marketplace as well as the legislative and political environment provides us with the knowledge to successfully deliver this project.

Our experience is the result of working on efforts similar in size and scope to SHARE. As you will see through our project qualifications, we are involved with these efforts at the federal, state, and provider level. This is a key differentiator of our team and one that will make the difference in the outcome of this effort. In addition, we bring the following capabilities that we believe will lead to the success of this project:

- Industry leading healthcare and government practice
- Leading consulting practice specializing in implementation of EHRs
- Understanding of HIE critical success factors that facilitate adoption and utilization
- Deep experience in patient consent and information security and privacy
- An established presence in Arkansas enabling an in-depth understanding of the local healthcare market

- Experience in integrating with Medicaid and other payor systems to drive improved patient outcomes
- Commitment to state and national healthcare reform and healthcare IT evidenced by our participation in critical ONC initiatives

The MedPlus/Deloitte Team's HIE business experience is significant, with several projects in production throughout the United States, Canada, and Europe.

MedPlus' Arkansas Experience

MedPlus has provided IT solutions to a number of providers throughout the State of Arkansas. We have installed our Care360 Labs and Meds physician office solution in hundreds of ambulatory settings in Arkansas and are in the process of upgrading many of these offices to our Care360 EHR solution.

We also have an extensive network of Professional Services personnel devoted to installation, implementation, training and support, of the Care360 application. These individuals, as well as personnel from the Deloitte organization, will be available to assist in the overall implementation and integration aspects of this project.

Deloitte's Arkansas Experience

Deloitte has staff and offices in Little Rock and are proud of service provided in the state. Deloitte partners with MedPlus in the implementation and operation of HIE capability. Specific to the HIT and HIE area Deloitte provides:

- Strategy development, planning and advisory services for HIT and HIE
  - HIE planning (Strategy and Operational Plans)
  - State Medicaid HIT plans
  - ICD-10 assessment, planning and roadmap development
- Financial advisory, modeling, and sustainment analysis for HIT projects and HIE
- Implementation for HIE and HIT – including associated process improvements and adoption
  - HIE solutions (in conjunction with MedPlus, for example)
  - EMR and EHR for health systems, hospitals and physician practices
  - Patient management and patient accounting/revenue cycle management systems for health systems, hospitals and physician practices
  - Information technology for Health Plans
  - ICD-10 implementation

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- Technology development – technology architecture, development and interface development
- Systems operations for HIE/HIT --- including application management services
- Independent verification and validation for Government programs and projects, including those within State Government

Deloitte's healthcare practice is recognized by Kennedy Information as the number 1 Global Healthcare Consulting practice. Deloitte is also ranked by KLAS as number 1 in healthcare revenue cycle services and number 2 in clinical information system implementation services. Deloitte brings more than 60 years of experience providing professional services to each segment of the healthcare industry (commercial providers and health plans, state health agencies and programs, and Federal health agencies and programs), with a strong local presence in both the public and private sectors. Summary highlights about Deloitte Consulting relative to HIT and HIE:

- Industry leading healthcare and government (State and Federal Government) practice
- Leading consulting practice specializing in implementation of EHRs/EMRs
- Understanding of and experience with HIE critical success factors and systems integration requirements that facilitate development and adoption
- Deep experience in information security and privacy
- Leading provider of program management and support services to the Department of Health and Human Services (DHHS) ONC for Health IT

Deloitte works with 38 states (Public Sector clients) providing a variety of services in many cases. With over 1,000 state Health and Human Services consultants, Deloitte provides strategy, technology and human capital based services to these states. An example of the services Deloitte provides to state health entities are:

- Business process analysis and assessments to 13 states
- Strategic planning to nine states
- IT and enterprise architecture and MITA assessment services to 13 states
- Technology implementation services

Some facts regarding Deloitte's healthcare client base:

- Nearly 80 percent of Fortune 1000 life sciences and healthcare companies
- Nearly 90 percent of the largest managed-care organizations (as ranked by AIS's Directory of Health Plans)
- Nearly 90 percent of Managed Care Organizations (as ranked by HealthLeaders - Interstudy 2008)
- 75 percent of the nation's Blue Cross Blue Shield Plans
- Over 65 percent of Honor Roll hospitals (as ranked by U.S. News & World Report)

- 10 of the 10 largest Healthcare Systems (as ranked by Modern Healthcare)
- 8 of the 10 largest For-Profit Healthcare Systems (as ranked by Modern Healthcare)
- 8 of the 10 largest Secular Not-for-Profit Healthcare Systems (as ranked by Modern Healthcare)
- 10 of the 10 largest Catholic Healthcare Systems (as ranked by Modern Healthcare)
- 8 of the 10 largest Non-Catholic Healthcare Systems (as ranked by Modern Healthcare)
- 60 percent of the top pediatric hospitals (as ranked by U.S. News & World Report)
- Over 70 percent of the Major Teaching Hospitals (as ranked by the Thomson Reuters Top 100 list)
- 15 of the 15 largest pharmaceutical manufacturers (as ranked by Med Ad News, June 2009)
- 10 of the 10 largest medical equipment makers (as ranked by Medical Product Outsourcing)
- 9 of the 10 largest biotechnology companies (as ranked by Med Ad News, June 2009)

Understanding the Scope of Work

The Table of Contents sets forth the contents of our response to the RFI and we are committing to our ability to supply the products and services required by SHARE.

Establishment of an HIE

The concept of a HIE infrastructure is by its very nature dynamic, evolving, and multi–dimensional with a myriad of linkages to community physicians, pharmacists, healthcare centers, home care, and other healthcare providers. We understand that the SHARE project is much more than just implementing technology. The deployment of this initiative is an opportunity to be a conduit of change to the way healthcare is delivered and managed and the way government entities, providers, and consumers share and store health information.

We believe our solution addresses the key characteristics typically required of an HIE. The table below details how our proposed solution addresses your requirements and the resulting benefits for SHARE.

Solution Characteristics	Benefit to SHARE
Scalable	▸ Fully scalable technology to incrementally integrate with Hospitals, FQHCs and EMRs in Arkansas, as well as Medicaid, payers, and other stakeholders, geographically widening the view of patient services. ▸ Efficient distributed architecture that allows SHARE to integrate additional healthcare facilities within the state and with other states.
Flexible	▸ Modular service-oriented architecture which allows third parties to easily integrate with the architecture. ▸ System architecture is sufficiently flexible and able to interface with existing HIEs.

Solution Characteristics	Benefit to SHARE
Secure	▸ A patient-centric security model focused on the patient data at the center, protected at each level by a layered, defense-in-depth security approach. ▸ Data encrypted at rest and in motion. ▸ Integrated authentication, authorization and auditing on a per transaction basis. ▸ Patient consent controls to confirm PHI is only available for viewing in a manner compliant with the policies of the exchange.
Standards-based	▸ The HIE is a "universal adaptor" to health IT systems. Our solution has IHE and HITSP standards built into architecture, including XDS.b, C32, PIX/PDQ, and ATNA. Additionally, interfaces to external systems in HL7 (both v2.x and V3).
Interoperable	▸ A true interoperable health exchange where people and organizations can efficiently, effectively, and securely share information about patients, treatments, and outcomes. ▸ Supports standards that are core to interoperability at the connectivity and the semantic level.
Service –oriented	▸ Built on a modular architecture which allows for various integration points through web services. External connectivity such as NHIN and IHE Web services leveraging WS-I profiles, and other Web service standards. ▸ MedPlus is at the forefront of ONC-related developments relating to NHIN Direct and will be participating in early pilot activity for these services.
Scalability	▸ Successfully deployed in a statewide (and Province-wide) capacity in New Mexico (and British Columbia) as well as the national scale for clinical messaging and CPOE.

Overview of our HIE Solution – Centergy Data Exchange

The graphic shown below sets forth the overall design of our HIE solution, which is formally known as the "Centergy Data Exchange (DEX)". This illustration depicts the typical sources of clinical and administrative data as well as the potential uses and users of this information. As detailed in the Proposal, Centergy has been deployed throughout North America in support of over 15 million patient lives within New York/NYCLIX (Manhattan), New Mexico, Long Beach Network for Health (California), and the province of British Columbia. Together with Deloitte, we are also implementing the District of Columbia Patient Data Hub which will extend connectivity to include data from Medicaid Safety Net hospitals in support of chronic disease management. This project is anticipated to be in full production later in 2010.

As the HIT arm of our parent company, Quest Diagnostics, MedPlus has also deployed Centergy to create the nation's largest interoperable clinical data exchange, known as the Clinical Hub. The MedPlus Clinical Hub currently connects more than 75,000 physician offices, 150,000 physicians, 800,000+ registered users and over 100 EMR vendors in the United States. It supports a patient population of over 100 million, delivers on average 1M laboratory transactions per day, and is operated as an ASP subscription service at near Six Sigma quality (99.999% uptime). Laboratory data from the Clinical Hub can be an important data source within a state-operated HIE to encourage provider adoption and uptake, particularly in conjunction with Medicaid programs. The design principles from this proven, highly scalable technology base are those we will offer to SHARE in support of the ARHIE.

Centergy DEX services also provide for routing and connectivity, authorization, security and collaboration, data aggregation and knowledge management in the form of analytics and reporting. We will be pleased to provide greater insights on the underlying architecture, features and functionality of this solution in the context of the overall proposal review and evaluation process.

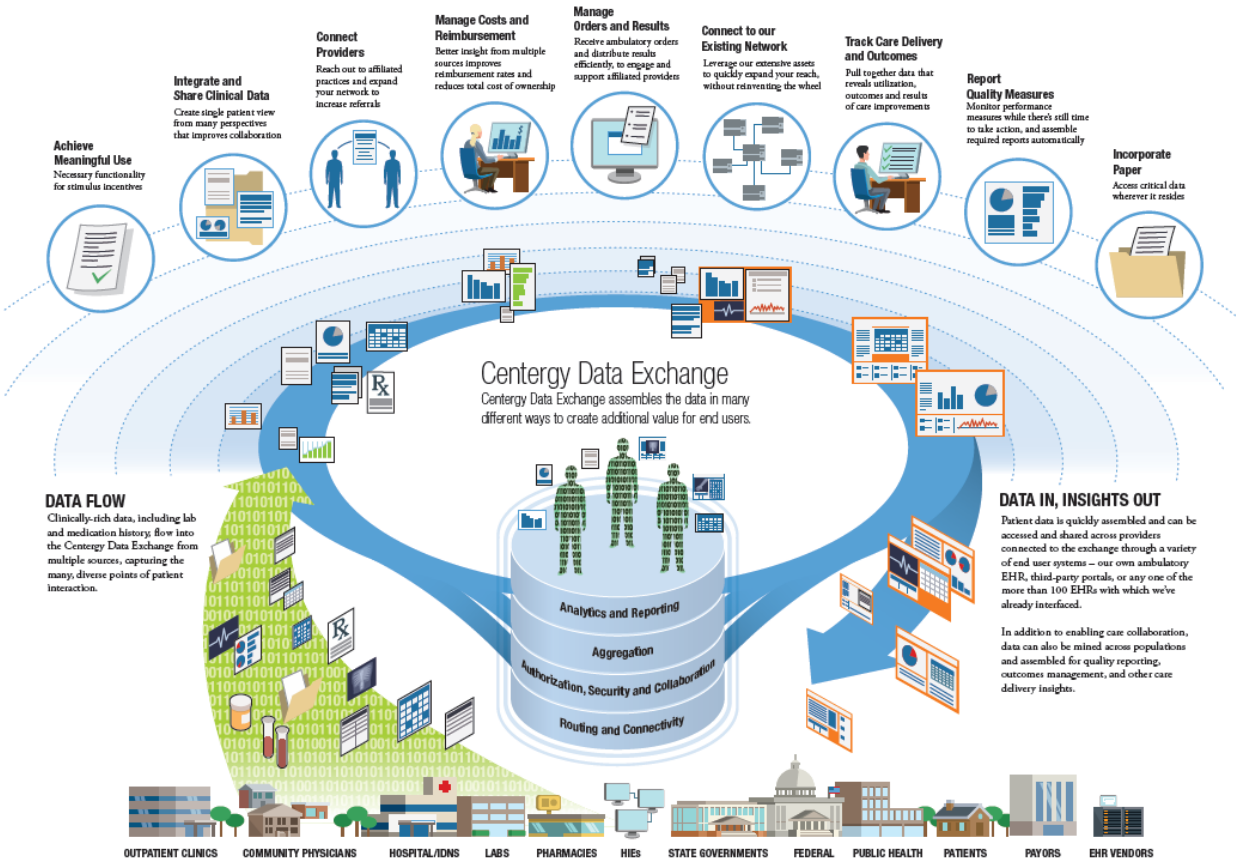

Figure 1. Overview of HIE Solution – Centergy Data Exchange

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Delivering Functional Requirements

MedPlus understands that clinicians are heavily reliant on the information that is available at the time of care in order to provide proper services. However, even the most diligent of patients cannot maintain the large quantities of healthcare history for medications, lab orders, test results, diagnostic procedures, allergies, reactions, and other treatment specific information. Additionally, caregivers are often reluctant to fully rely on a patient's memory of their condition, their previous medical history, or any historical treatments. This often leads to re-testing, re-verification, duplicative treatments, and conflicting medication prescriptions that are time-consuming, create large inefficiencies, reduce the service to the customer, and are potentially harmful to the quality of care.

SHARE's desire is to transform the healthcare environment by appropriately sharing patient information to support improved outcomes. This requires an understanding of each of the different healthcare players at a functional level, the services they provide and the information they require.

We bring experienced resources who understand the processes and data required to implement an HIE solution and have experience translating provider needs into reliable functional requirements.

How We Will Deliver the Project

Our project Partner, Deloitte, has successfully employed their HIE methodology in multiple community, regional, state and national-level HIE initiatives including projects for Wisconsin and Massachusetts, as well as the District of Columbia (as part of the MedPlus Centergy DEX - HIE implementation and project management team). Using Deloitte's dedicated and established HIE methodology benefits SHARE because it:

- Aligns with the ONC's five domains (Governance, Legal/Policy, Finance, Technical Infrastructure, and Technical and Business Operations) required for completion of the HIE Strategic and Operational Plans
- Includes a detailed stakeholder engagement framework well suited to facilitating and supporting work groups through the process of addressing the fundamental questions around each of the five domains
- Contains existing tools and templates across each task and phase of the project that serves to accelerate the initiative. Our tools and templates include the Deloitte HIE Estimator Tool, the Deloitte Security and Privacy Framework and the Physician Readiness Methodology

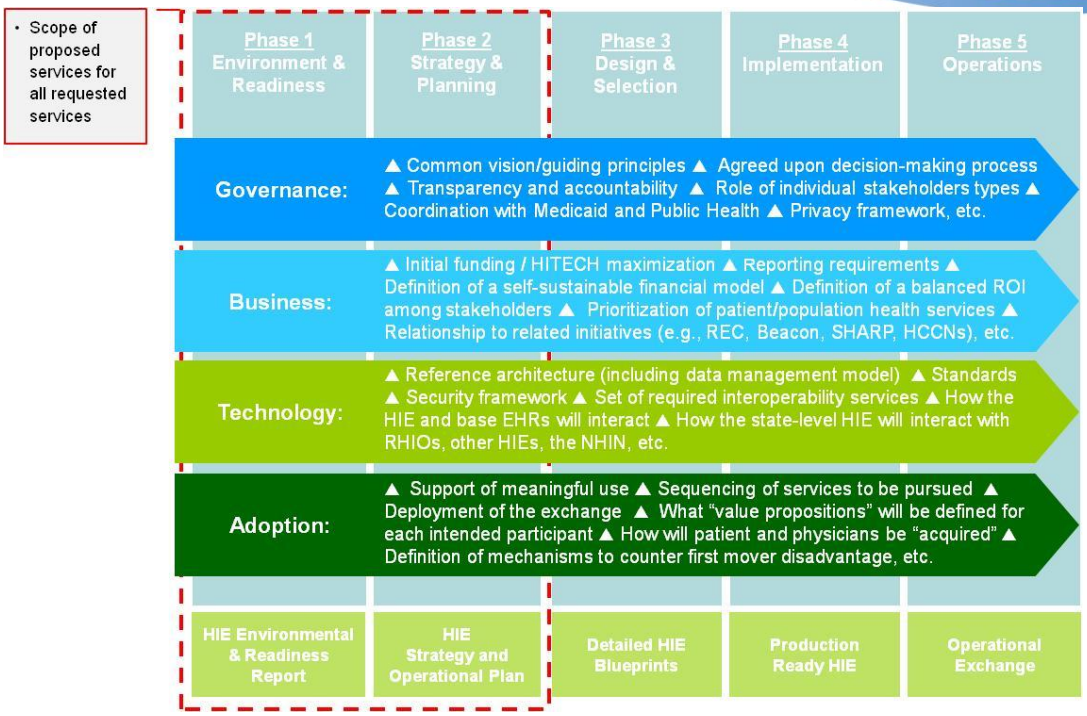

Figure 2. Deloitte's HIE Methodology for the SHARE Project

Commitment to Financial Sustainability

In the early stages of an initial HIE, stakeholders do not realize benefits equally. Our knowledgebase and financial modeling tool will be used to evaluate the costs and benefits associated with HIE initiatives by stakeholder type. By understanding where the imbalances lie, SHARE is positioned to develop the necessary mechanisms to reallocate benefits, help stakeholder groups realize benefits more quickly and develop a sustainable, long-term financial model.

A common challenge in HIE planning is obtaining a realistic estimate of costs (both onetime and ongoing) and benefits. Leveraging our hands-on experience with these projects, Deloitte has worked with public and private sector clients to develop efficient, parameter-driven financial models. The benefit component of these models is particularly developed and continuously enhanced to incorporate field experience (from us and others). As part of this planned engagement, we can promptly provide SHARE with two financial models that addresses HIE and HITECH:

1. **Leading HIE Financial Model – Ongoing Self-Sustainability.** Our strong belief is that after the initial build phase, SHARE must be financially self-sustainable. It must be premised on the ability to develop a financial model for information exchange and quality improvement that is adopted by and paid for on an ongoing basis by the many stakeholders who are already active participants in the health delivery and coverage/payment systems. This is a realistic imperative: ongoing financing is not likely to be an accepted political value proposition. Our teaming partner, Deloitte, has developed an efficient HIE financial model to help clients

determine the parameters of self-sustainability in terms of participant mix, the type of HIE-enabled initiatives selected, their phasing-in, redistribution and funding mechanisms, etc.

In the context of this engagement, the HIE financial model can provide SHARE with cost/benefit analyses of the planned HIE, with sensitivity analysis assessing the impact of various benefit realization, adoption, and participants mix. The HIE tool can actually directly provide ROI analysis for each key participant or participant type[1].

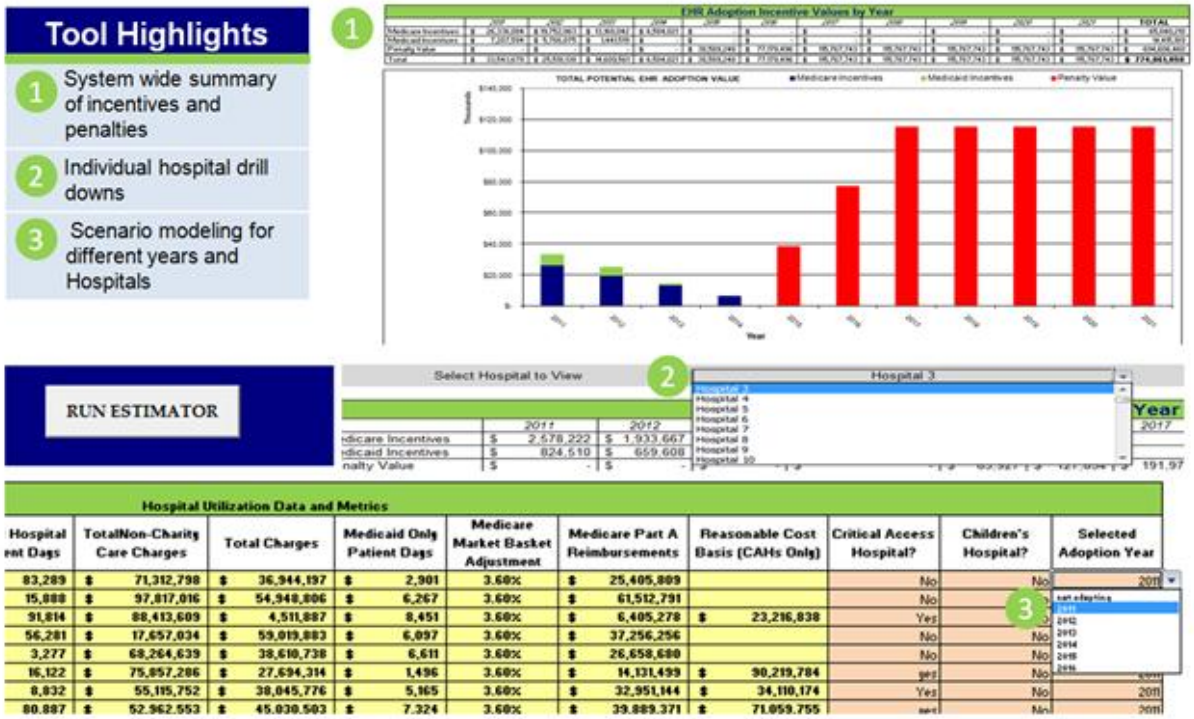

Figure 3. ROI Estimator Tool

2. **Leading HITECH Incentive Calculator.** This financial model is designed to calculate HITECH incentives and penalties, both for hospitals and providers. It includes a provider-specific view as well as multi-provide/statewide view. It allows what-if analyses to be easily performed to incorporate alternative sequencing and effective use scenarios. In the context of this

[1]HIE financial modeling typically shows a marked imbalance among beneficiaries, with providers (physicians/hospitals) bearing most of the costs, and payers (public or private), employers, and public health yielding most of the benefits. This is another reason to justify initial public financing but, more generally, best practice points to the need for realignment mechanisms to more evenly align costs and expected returns among HIE participants. These mechanisms range from investment incentives to pay-for-use (P4U) and pay-for-performance (P4P) programs. Best practice also points to the need to start with well thought-out but simple realignment programs, and evolve to the more sophisticated P4P programs over time. Performance metrics should be established to monitor progress, and incentives must be periodically adjusted to reward actual benefits realization

engagement, the HITECH Incentive Calculator can provide SHARE with both a good budgeting tool and, in time, a tracking mechanism.

While financial sustainability is on the watch-list for many HIE implementations, SHARE can feel confident that collectively, we can establish a model that is sustainable long term and can have a measureable return on investment while treating those who need it most.

Summary

Simply stated, it is our belief that our team is the most qualified to implement this HIE project for SHARE. Our experience with the healthcare ecosystem and HIE business and technology, combined with our knowledge of the State of Arkansas, provides us with the necessary set of tools and capabilities to deliver a successful project on-time and within budget.

The implementation of a regional or a statewide HIE is a not a project where a vendor can "swoop-in and swoop-out". It requires a long-term commitment and one that is built on an establishment of strong governance, trust, collaboration, and hard work. The MedPlus/Deloitte Team is uniquely positioned to deliver the broad scope of services requested by SHARE because we bring experience, capabilities, and resources which cannot be matched by our competitors. We are confident that our proposal demonstrates our combined experience in planning, designing, developing, and implementing statewide HIE systems is unmatched.

We are committed to building a successful solution which will make SHARE a national role model for HIE. To help provide success for this project, we believe the following factors should be considered when evaluating potential vendors:

1. **Relationships that Matter.** Selecting vendors who have strong relationships with key stakeholders and principal healthcare players at the federal, state, and local levels in both the government and commercial sectors will provide immediate credibility and help encourage stakeholder buy-in.
2. **Experience with Health IT and HIE.** Selecting firms with deep and broad experience in planning and implementing health information technology, especially HIEs and EHRs, is essential for navigating the business and technical issues faced by patients, providers, payors, and public health. SHARE should select a vendor with an ability to "reach back" to both institutional knowledge and practical customer experience to deliver the leading solution.
3. **A Highly Experienced Team.** Success stories usually point to the teams in place. Selection of a vendor capable of delivering a project team with experience working in healthcare and state government on initiatives of similar size and scope will be necessary to help confirm that the solution is a success. Team composition should include staff with a solid background in HIT and include clinicians.

We again appreciate the opportunity to present our credentials and look forward to discussing our proposal with you in the near future.

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If you have any questions regarding this response, please contact James Wright, Director of Business Development, who will be your primary point of contact from MedPlus:

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Best regards,

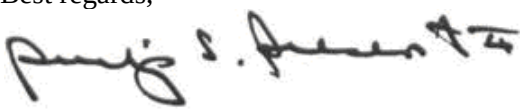

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Table of Contents

A. Mandatory Response Requirements (RFI 5.1)

1. Name and Category of Respondent

Name and Category of Respondent, such as systems integrator, licensee, service provider, hardware vendor, etc.

- **Name of Respondent** – MedPlus (Partner – Deloitte)
- **Category of Respondent** – Licensee and service provider

2. Name of Vendor Representative

Name of Vendor Representative responsible for any future business opportunity with the State of Arkansas. Include contact information. General vendor background and corporate information is not required, but may be included in the Addenda.

James (Jim) Wright is MedPlus's vendor representative who is responsible for any future business opportunity with the State of Arkansas.

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3. Summary Description of Solution

Summary Description of Solution, limited to three pages.

MedPlus' Centergy solution provides a provider portal, and a set of Web services to allow providers and facilities to integrate the SHARE accessible data into their workflow. This is the approach that the MedPlus Centergy suite of products provides. Figure 4 below sets forth the overall design of our HIE solutions platform, which is formally known as the "Centergy Data Exchange (DEX)". This illustration depicts the sources of clinical and administrative data as well as the potential uses and users of this information. First and foremost, we provide core elements of traditional HIE such as an Enterprise Master Patient Index (EMPI) and a Record Locator Service (RLS) embracing components supplied by our industry leading Partners Initiate and InterSystems. We include our own federated edge server technology and other connectivity services designed to flexibly aggregate and transport HIE content across disparate systems and sources, including integration with administrative (MMIS, payor organizations) systems from other entities. Scalability of this platform can be illustrated by the design of our production HIE now in use by NYCLIX (Manhattan) which anticipates participation by 9 million patient lives, or our province-wide implementation in British Columbia which includes over 130 hospitals and clinical facilities.

In addition to providing traditional HIE backbone services across North America to third party customers, MedPlus has also internally deployed key elements of our Centergy DEX in support of our parent company, Quest Diagnostics. **This deployment represents the largest interoperable physician network in the US connecting more than 75,000 physician offices, 150,000 physicians, 800,000+ registered users and over 100 EMR vendors. Further, as detailed in our proposal, it already supports clinical messaging and document delivery for our existing provider network scaling to 1 million laboratory transactions daily as a hosted ASP subscription service.** This proven capability will add value to the SHARE implementation by encouraging broader provider uptake and adoption. Our Centergy DEX Services provide a wealth of functionality in support of routing and connectivity, authorization, security and collaboration, data aggregation and knowledge management including care guidelines, analytics and reporting delivered with Partners such as MEDai. We will be pleased to provide greater insights on the underlying architecture, features and functionality of this comprehensive platform in the context of the overall proposal review and evaluation process.

Architectural Design

The MedPlus Solution architecture confirms that the inbound and outbound transactions solution will meet HITSP standards. The long-term goals of the exchange will incorporate recommendations of ONC, HITSP, and National Health Information Network (NHIN) and other industry groups as appropriate. We are committed to keeping the product in compliance with HIE standards provided by the U.S. Department of Health and Human Services as well as other relevant standards bodies. The high level architecture solution as shown in Figure 4 below complies with the HITSP standards-based, hybrid architecture with federated and centralized applications.

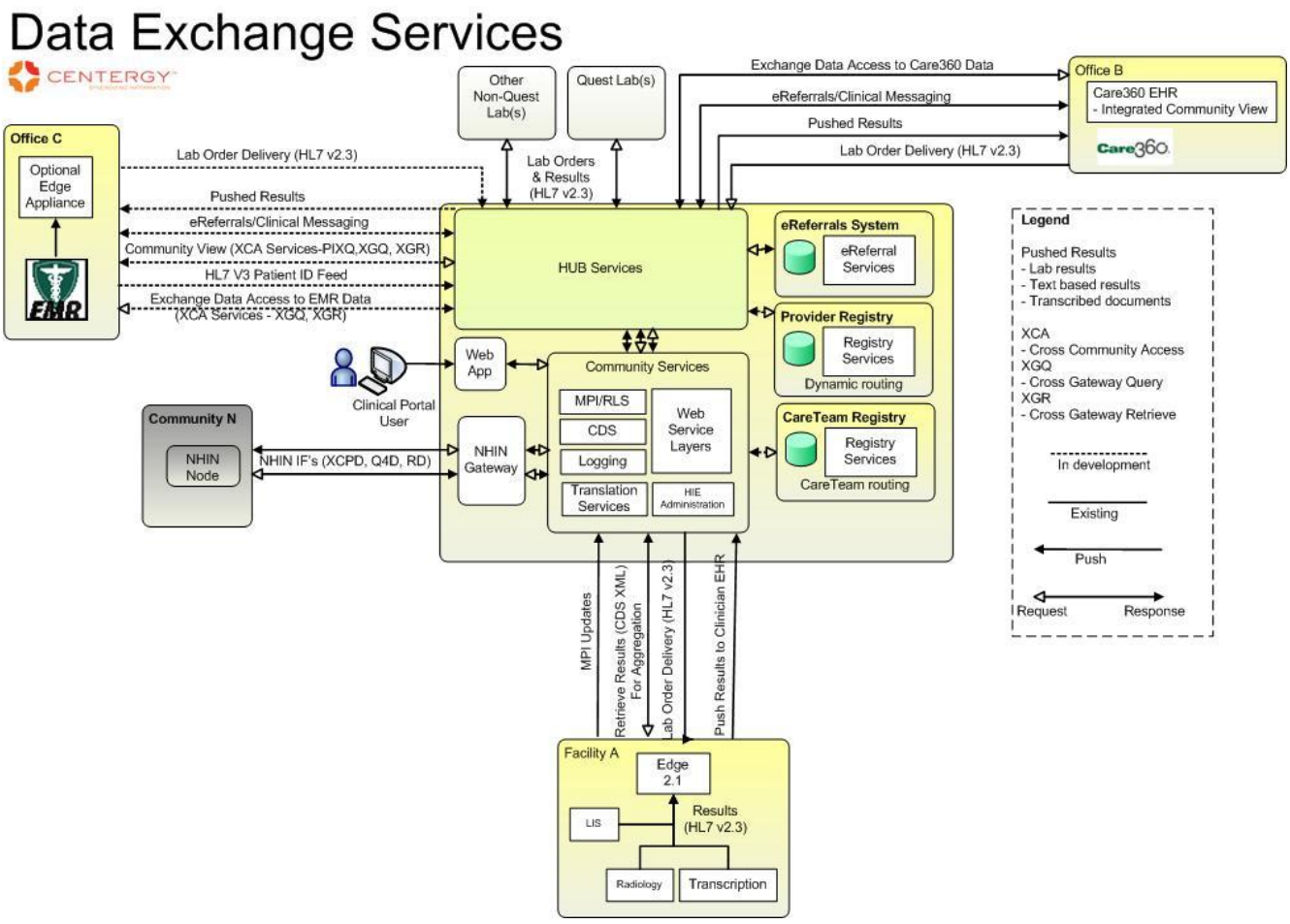


Figure 4. MedPlus Health Information Exchange Enterprise Overview

Solution Architecture Description

The MedPlus Solution consists of our Centergy DEX which includes Clinical Hub Services, Enterprise services, a Centergy Clinical Portal, and our Care360 product line: Care360 Labs & Meds, and Care360 EHR. The ambulatory community shown as Primary care physicians demonstrates how our solutions offer diverse approaches for integrating and interoperating with ambulatory providers on the exchange. There are a variety of viewing options for these providers depending on their specific needs. We offer a Clinical Portal viewer for those users who do not require EMR functionality. For Primary care practices, we offer direct integration with our ASP-based EHR offering, Care360. The physician can access the Care360 EHR with only an Internet connection, complying with ONC-defined meaningful use criteria without having to support thick client infrastructure in the practice offices. For practices that currently have their own EMR, we can embed Care360 to the third party EMRs allowing the EMR systems to handle lab orders and results by Single Sign On (SSO)/linking into the Care360 system. We are also able to integrate through Web services or via a locally placed integration appliance in the practice that provides bi-directional communication back to the DEX services depending on the EMR's capability. We currently support integration to Care360 and over 100 third party certified EMRs through our DEX services and are currently extending those services to enable integration from the local edge servers through the clinical messaging services for full end to end data exchange, routing, and aggregation. Also, we can integrate

summary records from the HIE with other administrative applications if required, such as claims and eligibility processing applications.

In addition the solution shows the HIE administration module for system administration. This allows HIE administrators to setup and use our Public Health Reporting service, integration to regional laboratories, hospitals, and services out to patients.

Finally, we support within DEX bi-directional data exchange and aggregation services. The integration to acute care facilities (hospitals) is accomplished through our federated model where an edge server is deployed at the hospital facility. The hospital facility will provide HL7 ADT feeds to the edge server on site. By providing this full end-to-end integration we allow users access to full patient community chart within their respective home system and their respective day-to-day workflows.

4. List of Current Installed Locations

List of Current Installed Locations for the recommended solution.

MedPlus HIE and Clinical Portal deployment experience is impressive, with several projects underway throughout the U.S. The MedPlus Solution was chosen for one RHIO in the state of New York – NYCLIX in Manhattan - sponsored by New York's Health Efficiency and Affordability Law (HEAL) program. In addition, MedPlus is leading the work of the New York Clinical Information Exchange (NYCLIX) project to participate in the NHIN Trial Implementations associated with the New York eHealth Collaborative (NYeC). Further, we are working with NYCLIX on meeting the objectives of the NY CDC program in support of BioSurvellience. We are confident these projects will not only help demonstrate our capabilities in this important market segment, but will also provide avenues worth consideration. MedPlus was also selected by the Provincial Government of British Columbia to provide a HIE to the entire population of the province throughout 150 hospitals including:

- Connectivity to 130 laboratories
- Connectivity with 17 different lab systems
- 4.5 million names in the index
- Approximately 10,000 doctors

Our references are listed in detail below:

Client Name & Location	**New York Clinical Information Exchange (NYCLIX), New York, NY**
MedPlus Solution	▸ Centergy Clinical Portal ▸ Centergy Data Exchange Services
Description	NYCLIX has assembled 14 of the premier health delivery organizations in New York City, including New York Presbyterian, New York University Medical Center, Beth Israel Medical Center, Bellevue Hospital, Kings County Hospital, Memorial Sloan Kettering Cancer Center, and Mount Sinai Medical Center. The NYCLIX project focus is on providing clinical data to emergency departments at the contributing provider organizations. The NYCLIX system had recently surpassed 2M patient records and continues to grow.
Installed	November 2008

Client Name & Location	**Long Beach Network for Health (LBNH), Long Beach, CA**
MedPlus Solution	▸ Centergy Clinical Portal ▸ Centergy Data Exchange Services
Description	LBNH has also selected MedPlus as the exclusive technology partner for their NHIN Trial Implementation. This project will focus will on providing Web-based clinical data to emergency departments at the contributing provider organizations as well as national integration across HIEs as a part of the NHIN program. This project represents over 1.5 million patients and over 1,500 physicians. The LBNH sites involved collectively represent 25 percent of all emergency visits, 33 percent of all Pediatric Trauma Centers, 20 percent of Level I Trauma Centers, and 23 percent of all Trauma Centers (Level I and Level II) in Los Angeles County.
Installed	September 2008
Client Name & Location	**New Mexico Health Information Collaborative (NMHIC), Albuquerque, NM**
MedPlus Solution	▸ Centergy Clinical Portal ▸ Centergy Data Exchange Services
Description	Lovelace Clinical Foundation (LCF), as the sponsor of the New Mexico Health Information Collaborative, has implemented MedPlus as the exclusive technology partner for the NHIN Trial Implementation. This project provides a community data aggregation infrastructure and portal to provide access to clinical data to local providers as well as national integration across HIEs as a part of the National Health Information Network program. This project represents almost 1 million patients and over 1,000 physicians. For NMHIC's Strategic and Operational Plan, please see: http://www.nmhic.org/supporting_files/New%20Mexico%20HIE%20Plan%20V7.1%20022610.pdf
Installed	September 2008
Client Name & Location	**Province of British Columbia eHealth**
MedPlus Solution	▸ Centergy Clinical Portal ▸ Centergy Data Exchange Services
Description	Being delivered in partnership with Sun Microsystems, this implementation of the MedPlus Clinician Portal and components of the Data Exchange Services will support over 150 hospitals across 6 Provincial Health Authorities, representing 4.5 million residents, including Vancouver Coastal Health, Fraser Health, Northern Health, Interior Health, Vancouver Island Health Authority, and the Provincial Health Services Authority. More information is available at http://www.healthservices.gov.bc.ca/socsec/index.html.
Installed	April 2009

Client Name & Location	**District of Columbia Patient Data Hub**
MedPlus Solution	▸ Centergy Clinical Portal ▸ Centergy Data Exchange Services
Description	The MedPlus Centergy Clinical Portal/Data Exchange solution will enable the District to achieve its goal of implementing secure central Medical Records Data Repository that can be economically shared by all participants, as well as integrating DOH programs and systems into a Medical Patient and Clinical Records sharing capability. Our intent is to aggregate the maximum amount of relevant patient data from determined sources and provide the most robust analytics, which will provide the District with superior clinical insights on patients, thus leading to better patient outcomes and lower cost of care. This program includes access to hospital-based patient data from MedStar (for Washington Hospital Center, Georgetown University Hospital, and the National Rehabilitation Hospital) via their Microsoft Amalga system. MedPlus already has interfaced with eClinicalWorks and is working to access their system in a number of HIEs that we are already involved in supporting.
Installed	February 2010
Client Name & Location	**South Dakota Department of Health, Pierre, South Dakota**
MedPlus Solution	▸ Centergy Clinical Portal
Description	Implement a Client Access Portal to enable a search for client demographic data from two disparate systems and launch one of the SD DOH applications via single sign on, passing this client's demographic data, as appropriate. Additionally implement interfaces from two SD DOH systems to keep the portal in sync whenever data is added or updated to these systems.
Client Name & Location	**University Hospitals, Cleveland, Ohio**
MedPlus Solution	▸ Centergy Clinical Portal ▸ Centergy Patient Portal ▸ Centergy Data Exchange Services
Description	In 2004 UH decided on a fast-track implementation of the MedPlus Clinical Portal/Data Exchange solution as a "bridge" solution to get to an enterprise EMR. The project plan called to implement an internal HIE within the UH Health System, integrating patient data from 15 source systems, supporting more than 800,000 unique patient records, 3 million outpatient visits and 110,000 inpatient discharges annually. The exchange would require a master patient index (MPI) component for resolution of each patient's identity across the wide spectrum of systems providing patient demographic and clinical data. The tolerance for possible errors in retrieving the right patient data was zero, and the speed required to ensure physician satisfaction would mandate a 4-second response time. From start to finish, the project took 8 months to implement, and was piloted by 150 physicians. Within 12 months UH expanded to 2,500 users, and in 2006 expanded again to 7,500 licenses. UH participated in the initial National Health Information Network prototype project in conjunction with Northrop Grumman Corporation (i.e., NHIN-1, completed January 25, 2007).

	As a result of the success of this project, UH has won numerous awards including: ▸ **CIO 100 Winner**, *CIO Magazine* - www.cio.com ▸ **Most Wired Innovator Award**, *Hospital and Health Network Magazine*
Installed	October 2004

5. Estimate of Implementation Timeline

Estimate of implementation timeline: Pilot project and broader installation.

Each project has a defined scope of work and a mutually developed project plan that is managed by the respective customer and the MedPlus Project Manager. Each implementation will have different timeframes that will be established early within the project lifecycle. Within the first phase of our implementation effort, the practice is evaluated for complexity and size. For a project as defined in the RFI, user enrollment, training, patient data interfaces and end-user readiness and rollout can be accomplished within a period of three to four months. There are factors that must be defined such as customer policies and protocols for use of pilot go-live events and lessons learned sessions between phased rollout cycles.

Please see the embedded sample HIE implementation timeline with date ranges beginning with May 2010.


Sample HIE
Implementation Timel

6. Description of the Financial Business Models Supported

Description of the Financial Business Models supported.

HIEs nationwide struggle for a sustainable business model. While primarily constructed utilizing grant dollars, most exchanges today rely upon membership dues or continuing grants to fund their operations. In circumstances where the administrative component can be offered as an adjunct to clinical exchange, business models have evolved creating opportunities for sustainability. This however, varies widely market by market and unfortunately in many cases has been "cherry picked" in key cities limiting the opportunity for a broad sweeping funding model.

The MedPlus/Deloitte knowledgebase and financial modeling tool will be used to evaluate the costs and benefits associated with HIE initiatives by stakeholder type. By understanding where the imbalances lie, SHARE is positioned to develop the necessary mechanisms to reallocate benefits, help stakeholder groups realize benefits more quickly and develop a sustainable, long-term financial model.

In the context of this engagement, the HIE financial model can provide SHARE with cost/benefit analyses of the planned HIE, with sensitivity analysis assessing the impact of various benefit realization, adoption, and participants mix. The HIE tool can actually directly provide ROI analysis for each key participant or participant type. HIE financial modeling typically shows a marked imbalance among beneficiaries, with providers (physicians/hospitals) bearing most of the costs, and payers (public or private), employers, and public health yielding most of the benefits. This is another reason to justify initial public financing but,

more generally, best practice points to the need for realignment mechanisms to more evenly align costs and expected returns among HIE participants. These mechanisms range from investment incentives to pay-for-use (P4U) and pay-for-performance (P4P) programs. Best practice also points to the need to start with well thought-out but simple realignment programs, and evolve to the more sophisticated P4P programs over time. Performance metrics should be established to monitor progress, and incentives must be periodically adjusted to reward actual benefits realization.

From a costing perspective MedPlus can be very flexible to match the funding streams that SHARE is planning on using to implement their HIE.

7. Suggested Service Level Agreement Terms

Suggested Service Level Agreement terms.

MedPlus confirms individual service level agreements (SLAs) with each customer and will do the same with SHARE. Typical SLAs include response time within 30 to 60 minutes for issues reported to Customer Support. Typical SLAs for various severity levels of problems are defined below.

Typical Customer Support Services Provided and Defined in Each Customer's Contract

Authorized Customer Contacts. Customers will designate individuals from the SHARE team who are authorized to contact MedPlus for support services. Customer Contacts must have experience with and trained in the Centergy Enterprise Suite products that are readily available to work with the MedPlus Support Team to resolve software and hardware problems.

Software Support Contacts. MedPlus will provide remote support service to Customer for the purpose of assisting Customer with application of the software and use of the Hardware. Customer may access MedPlus support through the Customer Contacts by calling **1-866-624-1928** (the "Software Support Number") or by sending an email to clinicalportalsupport@medplus.com at any time, ***24 hours a day/7 days a week***.

Standard Support. During the hours of **8:00 AM until 8:00 PM, Eastern Time, Monday through Friday** ("Standard Business Hours"), requests for Support will be routed to a "Support Team" member who will immediately assist Customer with any question or issue.

Emergency Support. Support outside Standard Support hours is considered "Emergency Support" and is reserved for issues classified as "Severity 1" or "Severity 2" below. Requests for Emergency support should be made by calling the software Support Number and not via email.

a. **Severity 1** – the system is down, is losing/corrupting data, or is effectively unusable for its primary purpose.

   - *Response for Severity 1 problems*. MedPlus support staff will work continuously to resolve the problem when contacted 24x7. The solution may involve a configuration change, operational change, or software patch. Customer will be notified immediately upon any significant progress towards a resolution by the software System Support Engineer and provided a daily status report by the software System Support Manager.

b. **Severity 2** - a major feature of the system is not working that significantly impacts hospital operations.

- *Response for Severity 2 problems.* MedPlus support staff will work continuously to resolve the problem when contacted 24/7. The solution may involve a configuration change, operational change, or software patch. Customer will be notified upon any significant progress towards a resolution by the software System Support Engineer and provided a weekly status report by the software System Support Manager.

c. **Severity 3** - a less important part of the system is not working or the problem only occurs under very infrequent circumstances. The application and overall system are still usable and the operational impact of the problem is minor.

- *Response for Severity 3 problems.* MedPlus will resolve these issues in the next scheduled maintenance release or an upcoming general release of software.

d. **Severity 4** – a very minor problem having no operational impact.

- *Response for Severity 4 problems.* MedPlus will consider fixing these issues in a future standard release.

8. Estimated Cost of Solution Components

Estimated Cost of Solution Components, including license fees, third-party license fees, hardware (server and storage), and recurring maintenance fees.

Pro Forma Pricing

ITEM	DESCRIPTION	APPROX. PRICE
	Back Office Hardware	**Each server**
HP Proliant DL 380	Web Server	$16,500
HP Proliant DL 380	Application Server	$15,800
HP Proliant DL 380	Record Index Server	$25,600
HP Proliant DL 380	MPI Server	$19,200
SAN	SAN	$65,000
Rack, KVM, Console, and PDUs	Rack, Keyboard, Video, Mouse Selector Switch, Console and Power Distribution Units	$11,000
	Centralized edge server (if needed)	
HP Proliant DL 580	Edge servers (capture and transform clinical data from multiple hospitals systems and multiple physicians systems into a permanent data store)	$19,500 each
	Facility edge servers	
HP Proliant DL 380	Edge servers (capture and transform clinical data from hospital systems and physician	$11,500 each

	system into a permanent data store)	
License Fees Software	**Method used to compute pricing agreements**	**Approx. Price**
Clinical Portal and Back Office	Perpetual license fee based on number of unique patient identifiers. Licenses are purchased in blocks of 1,000 users.	$300K to $600K
Initiate Patient EMPI	Perpetual license fee based on number of unique patient identifiers.	$135K to $450K
InterSystems	Data integration engine	$60K to $120K
Care360 EHR	Physician Services products are sold as subscription services. Meets Meaningful Use requirements.	$250 to $400 per user per month
Terminology Services	A centralized service capability to apply and managed.	$50K plus mapping services
Disease management and disease surveillance and reporting	Annual subscription fee based on number of patients.	$0.50 to $1.10 per patient
Implementation Cost	**Based on previous experience for implementation including project management**	**Approx. Price**
Project Management	MedPlus (depending scope of project)	$175K to $350K
Solutions Architect	MedPlus (depending scope of project)	$35K to $70K
Implementation Consultant	MedPlus (depending scope of project)	$45K to$90K
Facility edge server Setup	MedPlus (depending scope of project)	$3.5K (per server)
Back Office Setup	MedPlus (depending scope of project)	$35K to $60K
UI Customization	MedPlus (depending scope of project)	$75K to $120K
Training	MedPlus (depending scope of project)	$50K to $70K
Initiate Setup Services	Initiate (depending scope of project)	$20K to $50K
MEDai Setup Services	MEDai (depending scope of project)	$65K to $100K
Interface costs	**Costs associated with interfaces and exchange of data**	**Approx. Price**
Integration Services	MedPlus (based on complexity and number of interfaces, approx. 7 to 9 interfaces per hospital data source)	$8K to $15K each interface
Support and Maintenance	**Costs for support and maintenance**	**Approx. Price**
Hardware Maintenance	MedPlus back office and facility servers (based on percent of hardware and software costs)	Based on hardware requirements 20% of total
Clinical Portal Support	MedPlus Centergy Clinical Portal HIE software support (based on number of end users)	Based on software needs and user number 18% of total

Initiate Patient EMPI	Initiate MPI software support (based on population within the HIE)	Based on population and UPI 24% of total
Integration Support	MedPlus Integration	Typically 5% of total interface price

B. General Solution Description (RFI 5.2)

This section should build on the Summary Description of Solution. It should describe how the solution addresses each of the following elements described in Section 4, Descriptive Information about the SHARE:

1. Interoperability

The MedPlus Centergy Suite of integrated solutions will provide a solid platform for interoperability for SHARE. As an organization we bring a proven product suite and professional skill to enable SHARE to meet the goal of interoperability and support for meaningful use criteria for Clinicians, Citizens, Public health entities, and private and public Payers.

Extracting and effectively leveraging clinical data is critical for Clinicians to meet meaningful use to meet the needs of clinicians. The Centergy Clinical Portal addresses the needs of the patient centric community view of the SHARE. Hospitals can opt into the exchange and share critical patient information to other Clinicians within the community. Both the inbound and outbound transactions meet HITSP standards.

Our Centergy product enables community to community information interchange at the national level with the products ability to exchange information compliant with the Federal Health Architecture standards from the Office of the National Coordinator for Health Information Technology (ONCHIT). The Centergy Clinical Portal has successfully demonstrated HIE-to-HIE patient data sharing as part of the NHIN's Trial Implementations Core Content Testing Event. The December 2008 event represented the largest such demonstration of NHIN capabilities to date.

Through the Centergy DEX usage of Web service technology we will enable SHARE to aggregate data from and share data with community physicians EMRs and EHRs as shown in the diagram below. The types of data available to the HIE are Prescriptions, Medication histories, Lab results, Continuity of Care documents, Orders, Reports, Encounter/Discharge Summaries, Vital signs, Demographics, Forms, Transcribed notes, and Referrals. Integration with the physician EMRs complies with IHE standards enabling interoperable community and data exchange with individual physicians who have existing EMR technology.

If physicians desire to become a part of SHARE and do not have an existing EMR, our Care360 EHR solution will enable SHARE to offer these participants a solution. Our Care360 EHR is our ambulatory EHR offering that will not only provide core functionality to document a full clinical encounter, but will also enable Physicians to take advantage of stimulus incentives as part of the 2009 American Recovery and Reinvestment Act (ARRA). This product leverages the interoperability standards currently supported by the full MedPlus offering.

In addressing the Arkansas citizens desire to see and access their own PHI, we provide the ability to integrate into a patient's PHR through our Care360 product. The patient can securely send laboratory results electronically to a patient's Google Health, Microsoft HealthVault or KEAS PHR system (example shown in Figure 5 below).

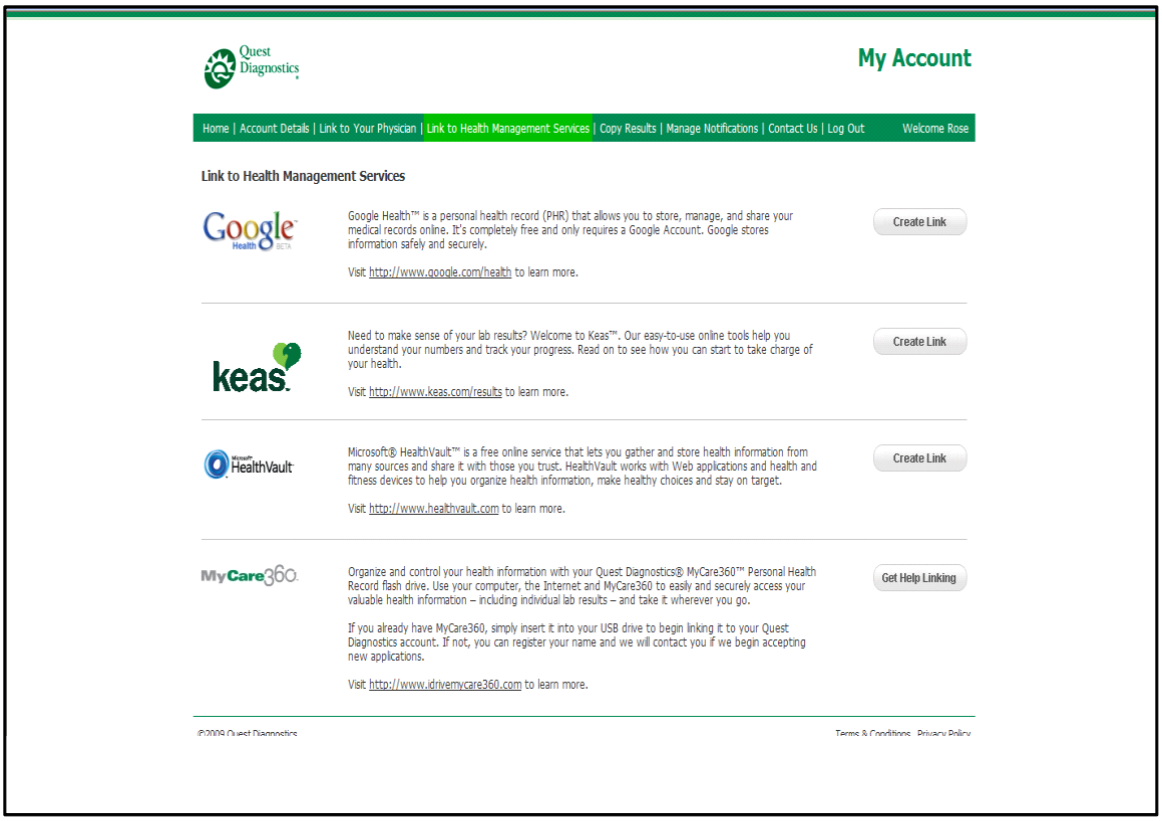


Figure 5. Patient Health Record Interoperability

Public health has consistently been one of the key applications which could extend the functionality of a HIE infrastructure. Our Centergy product suite has already deployed several relevant use cases. Through our work with the CDC and various state and municipal departments of health, we have provided health alerts to a variety of end users. Specific examples of our PHR infrastructure includes delivering influenza alerts and anonymous clinical data to the New York State and New York City Departments of Health for the past year as part of a CDC grant, implementing a look-up interface to the District of Columbia's Immunization Registry, and delivering reportable lab results from throughout New Mexico to the State's Department of Health.

Through the standards defined by the New York eHealth Collaborative, we have adopted the Universal Public Health Node (UPHN) protocols which allow for a number of dynamically configurable capabilities through Web services such as remotely defining new reportable conditions, subscribing to feeds of counts or anonymized clinical data, and allowing a public health "drill down" to more closely review a potentially suspicious case. Finally, the system can re-identify a previously examined case to allow the public health worker to unmask a potential "Typhoid Mary". These enhanced UPHN capabilities will be generally available in early 2011.

As part of the integration effort desired by the SHARE the Centergy product suite can be implemented to interface bi-directionally with the Arkansas Immunization Registry. There are a number of options for retrieving immunization data, all of which depend on the specific use case of the data. The high-quality approach would allow the registry to connect to the SHARE and provide demographic and clinical data to an edge server. This would allow the full capabilities of the Initiate Master Patient Index (MPI) to be applied to match the immunization records with the rest of exchange's data. Through this use,

immunization data would appear seamlessly within a patient summary as described in the inquiry section.

Alternatively, the HIE can implement a simple Web service-based immunization record retrieval that will retrieve the immunization data on an as needed basis from the registry. The triggering event for the retrieval could either be automated as part of the inquiry process, or it could be a separate manual query if someone is interested only in immunization data. The latter is how MedPlus has linked to the District of Columbia Immunization Registry.

Based on the spectrum of mechanisms that the MedPlus Centergy product suite is able to support, we are confident that we can connect to the Arkansas Immunization Registry and the Bureau of Public Health application, and we can be flexible to meet the needs and requirements of the SHARE.

We offer SHARE the capability to phase in product usage as data providers and clinicians come into the exchange and support the HIE participants varying levels of electronic data exchange capability. The patient community view through the Centergy product suite will provide data aggregation through the exchange MPI and the Master Encounter Index/RLS. Community data exchange will be enabled through secure means and present the ability for the SHARE to present the data to the community through a viewer portal, as well as the ability to push and pull information into participating EMRs.

The ability to support the SHARE in delivery a viable proof of concept in the 2011 phase of the project is possible with both the strategic direction of MedPlus and the track record of support we offer to our clients. We would plan to fully support the following types of data for the SHARE through our product suite offering:

- **Demographic Data**. Address, phone number, date of birth, age, primary language, next of kin, and advance directive status
- **Insurance Information**. Insurance provider, insurance number(s), date added, dates of eligibility, and the data source
- **Diagnosis Information**. Date of diagnosis, resolution date, procedures ordered, procedure date, the rendering provider, associated diagnosis, and the data source
- **Problem Lists**. Including data added, date resolved and source system
- **Medication Histories**. From hospitals, insurers, PBMs, EMRs and SureScripts[2]
- **Prescription History**. Medication, dose, route, frequency, ordering provider, and last fill date
- **Allergies**. The allergen, the severity, the date the allergy was received by the HIE, and the data source
- **Laboratory Results**. The test(s) performed, the result and associated unit of measure, the reference range, an abnormal flag for results outside the reference range, the ordering provider, the result date, and the data source
- **Radiology Results**. Reports
- **Immunization History**. From the State registry or from other connected EHRs
- **Clinical Notes**. Discharge summaries, ED discharge summaries, transcribed notes and encounter notes, surgical notes, procedural notes such as cardiology and invasive radiology, treatments, and care plans

[2] Surescripts medication histories require an additional transaction fee when requested outside the context of an ePrescribing event.

- **Providers**. Who is providing the individual's care, provide type, affiliated organization, and the data source
- **Encounters/Visit History**. Date of the out-patient episode of care, the admission and discharge date for an inpatient treatment episode, the condition or diagnosis associated with the encounter, the provider, the location of care, and the data source
- **MMIS Claims and Encounter Information** (if available)

The SHARE implementation will include branding and other customized portal features.

2. Technical Architecture and Approach

MedPlus relies on a hybrid solution offering using both Enterprise and Software as Service components, each optimized for different aspects of the HIE stack. For simple distribution of results throughout the community, the solution revolves around an ASP offering which is scaled to routinely delivery over a million results a day to hundreds of instances of over 100 unique hub certified EMRs. By leveraging the solution which was originally developed for Quest Diagnostics and exposing it through open and published standards we are able to deliver content more efficiently than virtually any of our competitors. This messaging infrastructure is called our Clinical Hub and is offered as a standalone service or in combination with our more advanced patient centric Enterprise Services which includes the traditional HIE components of Master Patient Index, Record Locator Services, Physician Directory, a Clinical Portal, a Patient Portal and an NHIN gateway. The combined solution is shown in Figure 6 below:

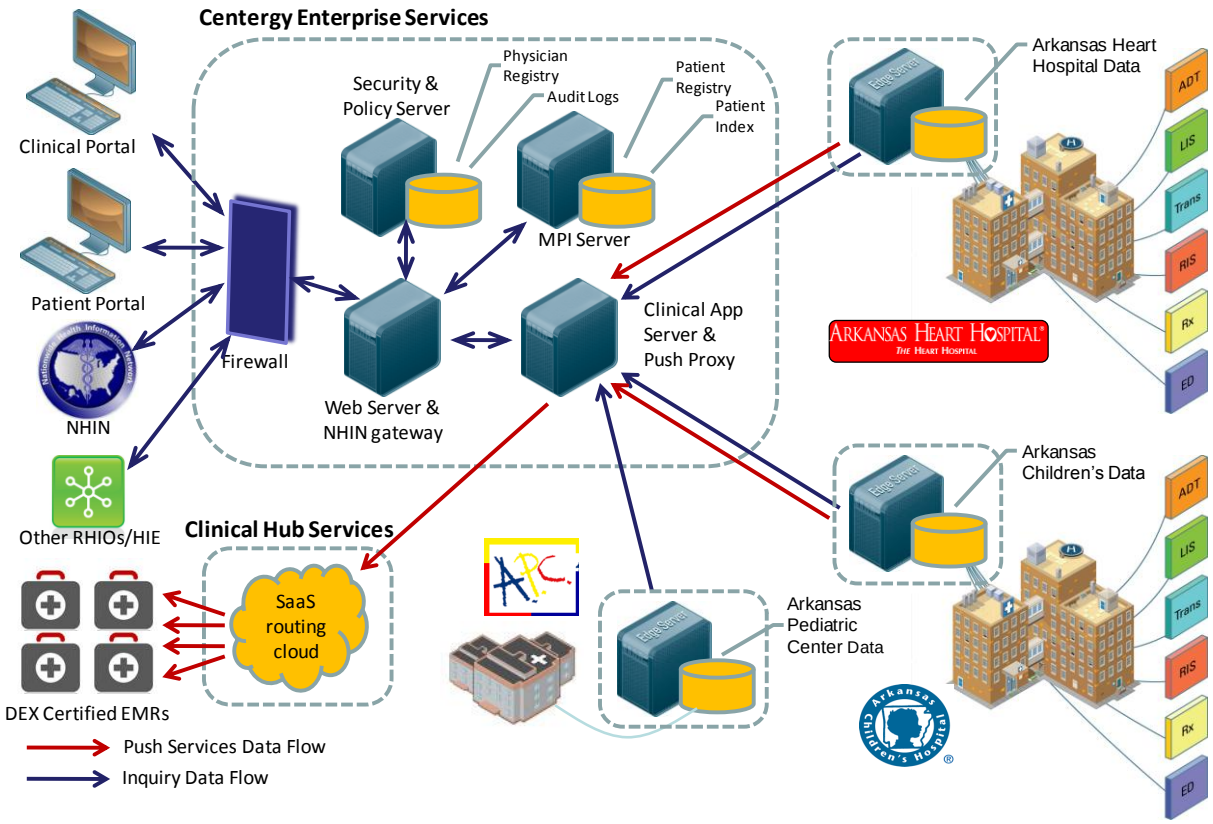


Figure 6. Physical Architecture for ARHIE

This architecture dovetails with the HIE technical architecture schematic provided in the RFI and is able to connect to all the constituent types identified. We have connected hospitals, clinics, MMIS systems and reference labs through the use of our edge servers. We are able to connect HIEs either with traditional HL7 2.x feeds, or we are able to connect using IHE protocols (either XCA or XDS.b); commercial payers can feed information into our edge servers or be queried via gateway in real time. All transactions are audited, and all communications between nodes is encrypted, or the edge server is put into behind a secured firewall such as in a hospital's network.

The edge server architecture allows clinical content to be collected in advance of the actual request for the information, but still leave it under control of the contributing entity. This hybrid approach provides the best of both worlds in that it decentralizes control of the data like a true federated approach, but it provides the consistency of performance of a centralized system because the schema's and indices on the edge repositories or "vaults" are all the same. An edge server can support a single facility, or it can be a "vault" for multiple entities providing enormous flexibility in the deployment and configuration of the overall HIE. Also once the MPI, RLS and other core capabilities are in place the solution can very gracefully be upgraded by adding new facilities simply by adding edge servers. The edge servers all include the Ensemble integration engine from InterSystems which provides a best in KLAS flexible integration capability able to adapt to whatever the local participants are able to provide.

The overall architecture is based on modular Web services and leverages the current best practices in managing a distributed architecture.

3. Design Principles and Requirements

Upon review of the documentation provided herein SHARE will clearly see how well the MedPlus solution suite fits with the SHARE design principles and complies with the ARHIE requirements.

*The HIE will be **"vendor neutral,"** i.e., vendor products must be non-proprietary and interoperable with others.*

MedPlus firmly supports the implementation of implementation and utilization of interoperable standards and has been involved not only in participating in standards work groups but also in demonstrating our ability to work with others. As part the NHIN project (of which MedPlus won three of the nine NHIN awards) we demonstrated interoperability with between our HIEs and other vendors; this year we participated in the HIMSS interoperability showcase demonstrating interoperability between a number of California RHIOs.

*The HIE will **rely upon a network**, or infrastructure, to provide service functionality. The HIE will be **a "hybrid" architecture**; not completely federated nor centralized. In the development of a phased implementation, it may be practical to start with a centralized architecture and evolve to a "hybrid" architecture.*

MedPlus' architecture was the first to implement a hybrid federated architecture as part of the research efforts that came out of the Patient Safety Institute back in 2002. Our architecture provides a set of enterprise services (MPI, RLS, Auditing, etc.) that efficiently interact with our edge servers which can be deployed centrally or on premises at the major facilities and health care providers in Arkansas. Access to the application is Internet-based.

*The HIE will be focused on **facilitating exchange of information**, rather than the end user application functionality. Our Centergy Suite of exchange services allows SHARE to implement push services (sometimes referred to as clinical messaging), inquiry services (also known as data aggregation) and eReferral services*

between HIE participant all using appropriate standards, such as CCD documents, and IHE profiles (XCA and XDS.b).

*The HIE will support construction and aggregation of the **longitudinal patient record** for secure sharing among authorized users across the network.*

Through the implementation of our MPI (which we OEM from the MPI leader in healthcare, Initiate Systems) and our edge servers we are able to efficiently and dynamically assemble a comprehensive longitudinal patient record, which can be nomenclature standardized, viewed in our portal or passed to external systems as standards-based CCDs.

*The HIE will comply with current **interoperability standards** available in the market today.*

We support our clients through the implementation of the NHIN interoperability standards and continue to work at refining the practical aspects of the standards at our various customer sites. Furthermore we are leading the charge on the NHIN Direct and are supporting ONC's initial pilot that should be live by early fall of this year.

*The HIE will **interoperate with existing community and private health information exchanges** as well as the NHIN infrastructure.*

Our solution support both the Cross-community Access (XCA) and Cross-domain Document Sharing (XDS.b) transaction sets which are at the heart of the NHIN, and are the two methodologies emerging as the way to allow existing RHIOs to share with a state infrastructure.

*The HIE technical architecture will be **scalable and expandable**.*

Scalability has been built into our solution from the ground up. We have integrated the most robust MPI engine in the industry. Our edge servers have one of the highest performing integration engines in the industry and everywhere we could be built our infrastructure for scale. Our clinical messaging infrastructure supports the largest clinical lab company in the world and delivers in excess of 1,000,000 results per day. Our RHIOs are growing rapidly including our customer in New York City which is adding 100,000 new patients to their exchange every month.

*The HIE will utilize **standard security protocols** supporting user authorization, authentication, non-repudiation, encryption, and administration. It also should support security auditing functions.*

As part of our solution's compliance with the NHIN and HITSP standards comes the security and privacy aspects that have been implemented and tested, including WS-security and ATNA compliance. The security and auditing capabilities we provide have been "white hat" hacker tested, and have been reviewed and validated by a number of discriminating clients.

*The HIE will utilize **standard data storage and management protocols** normally associated with large information technology solutions and available in the market today.*

The Centergy suite of offerings, whether ASP, hosted or provided in your data center, implement data storage, data backup and infrastructure monitoring as a top tier information management company would. Our scale in terms of transactions and volume of customers demands it.

*The HIE will be supported by industry standard **business continuity and disaster recovery** infrastructure and processes.*

MedPlus has already implemented business continuity processes and our implementation partner Deloitte has an entire methodology which can be brought to bear to enable our solution to meet the availability requirements set forth by SHARE.

*The HIE must be compliant with the **accessibility requirements** as defined in Arkansas Act 1227 of 1999.*

The Web-based user interfaces provided by MedPlus meet the majority of the accessibility requirements "out of the box" since the usability of our solution is one of the major differentiators.

Clinical Portal Data Display

The following screenshots are depictions of how data is display in the clinical portal and an example of how such information could be branded to support ARHIE.

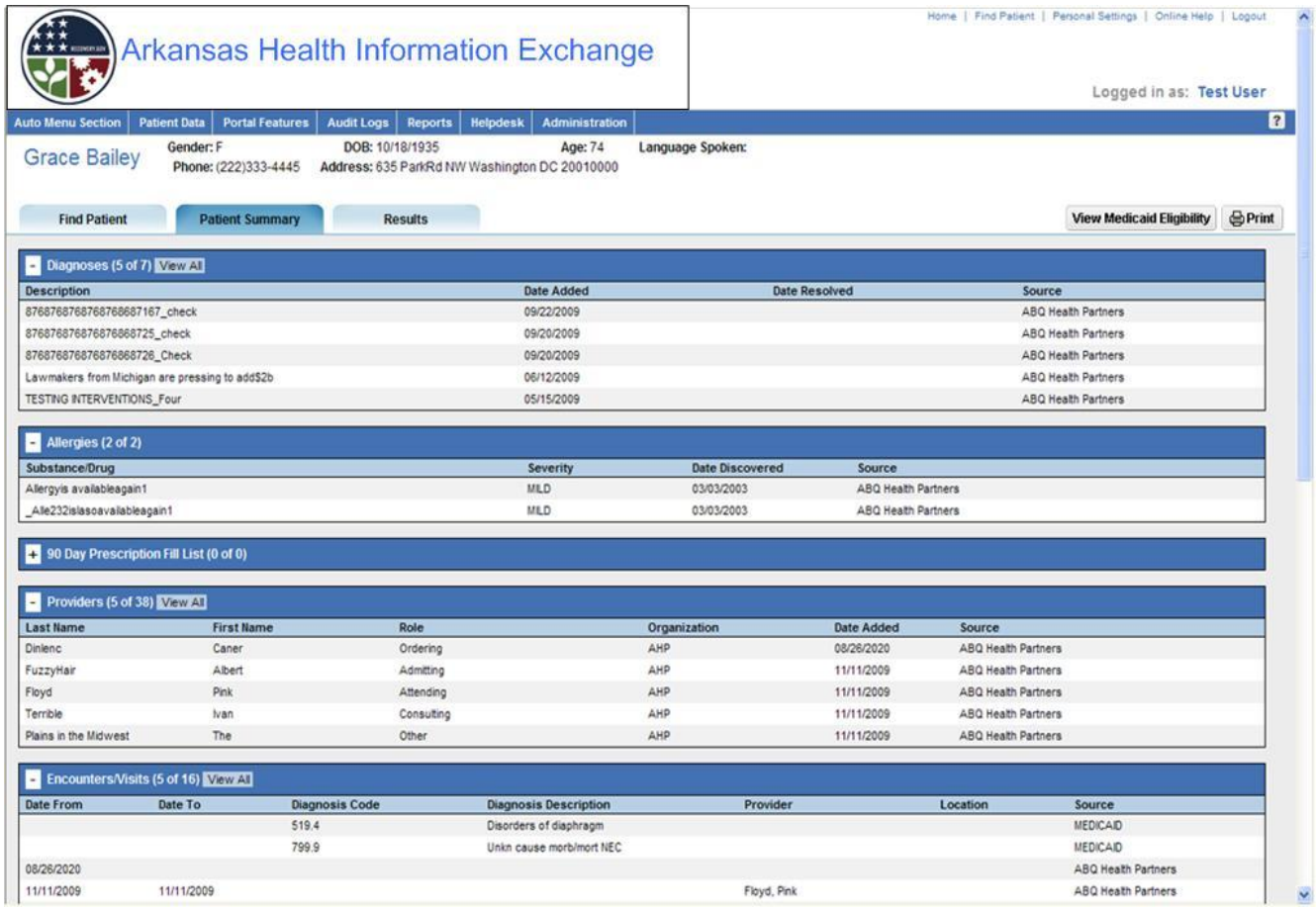


Figure 7. Portal Patient Summary Screen

In Figure 7 we demonstrate a patient summary currently available in the Centergy Clinical Portal. Printing capability is handled through the browser allowing clinicians to print the screen shown for paper chart records as needed.

The Centergy Clinical Portal can display diagnoses, allergies, 90-day fill list, providers, visit history, lab results, and vital signs. Procedures, payors, sources of support and immunizations are shown in the

following figures. As a part of the 2010.2 release upcoming in 2010 we will support the ability to display XDS registered Episodic C32/CCR documents in a new portal tab.

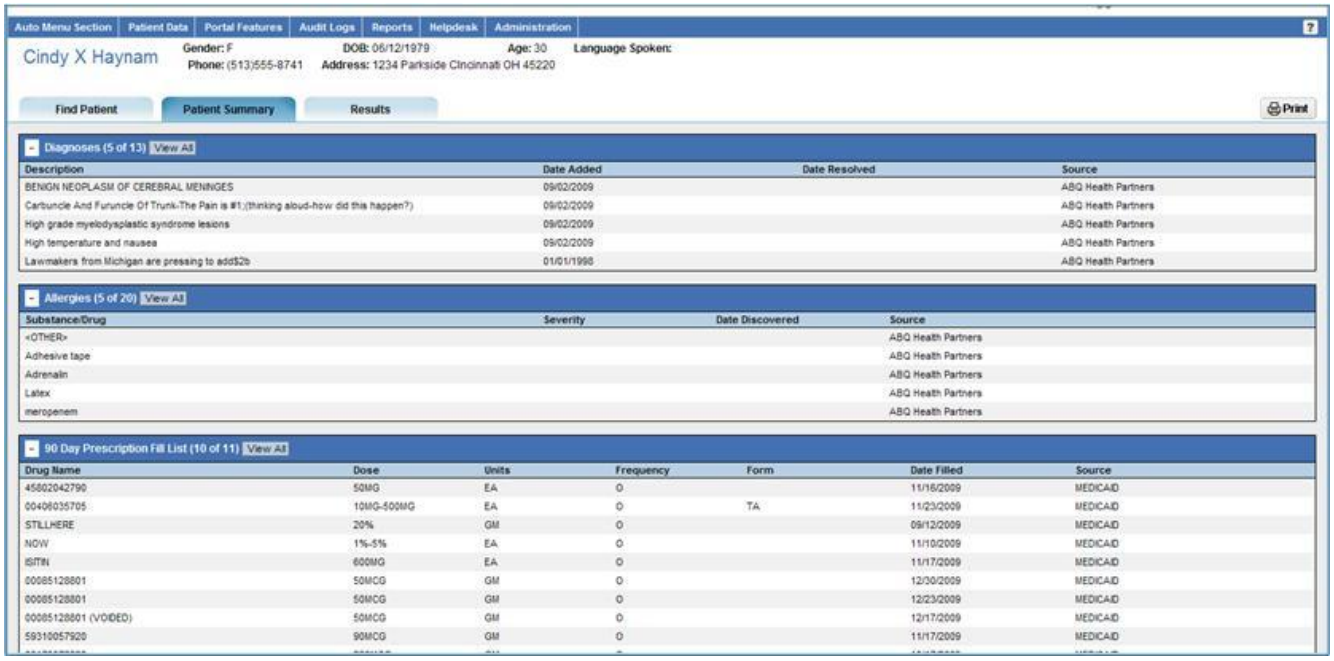


Figure 8. Diagnoses, Allergies and 90-Day Fill List

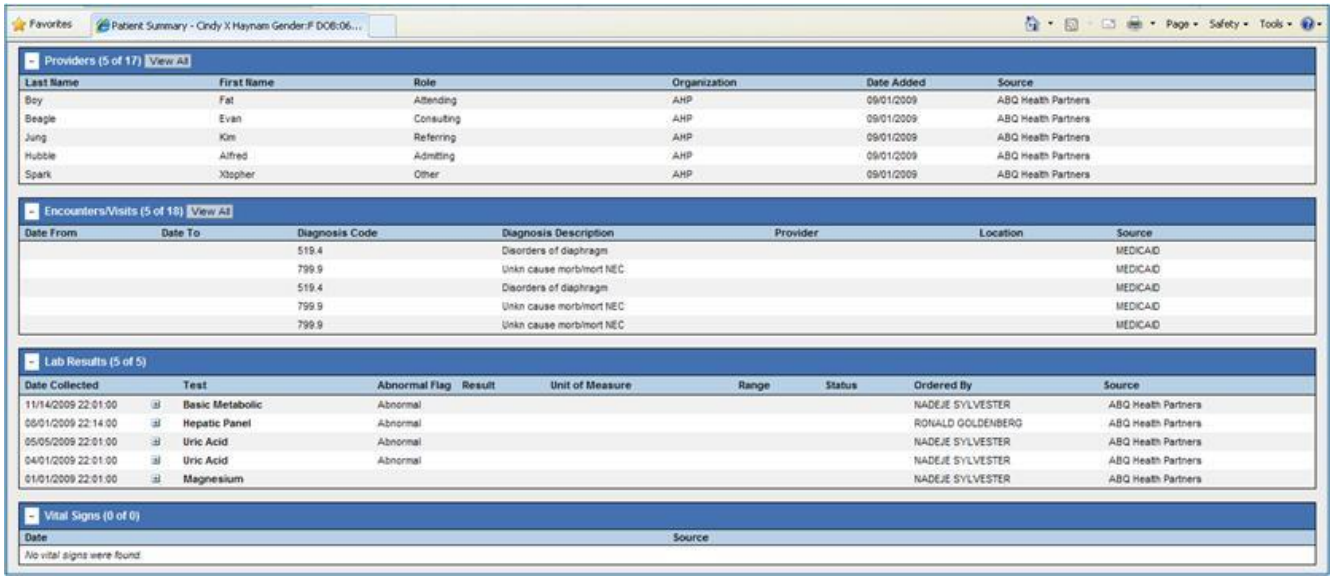


Figure 9. Providers, Visit History, Lab Results and Vital Signs

Procedures (5 of 8) View All

Procedure Code	Procedure Description	Date Performed	Ordering Provider	Source
93.54	APPLICATION OF SPLINT	09/01/2009	Boy, Fat	ABQ Health Partners
67.2	CONIZATION OF CERVIX	09/01/2009	Boy, Fat	ABQ Health Partners
73630	DESC1	09/01/2009	Boy, Fat	ABQ Health Partners
73610	DESC2	09/01/2009	Boy, Fat	ABQ Health Partners
71101	DESC3	09/01/2009	Boy, Fat	ABQ Health Partners

Payors (5 of 7) View All

Company Name	Date Added	Source
Medicaid	11/01/2009	MEDICAID
Medicaid	09/01/2009	MEDICAID
Medicaid	07/01/2009	MEDICAID
Medicaid	05/01/2009	MEDICAID
Medicaid	03/01/2009	MEDICAID

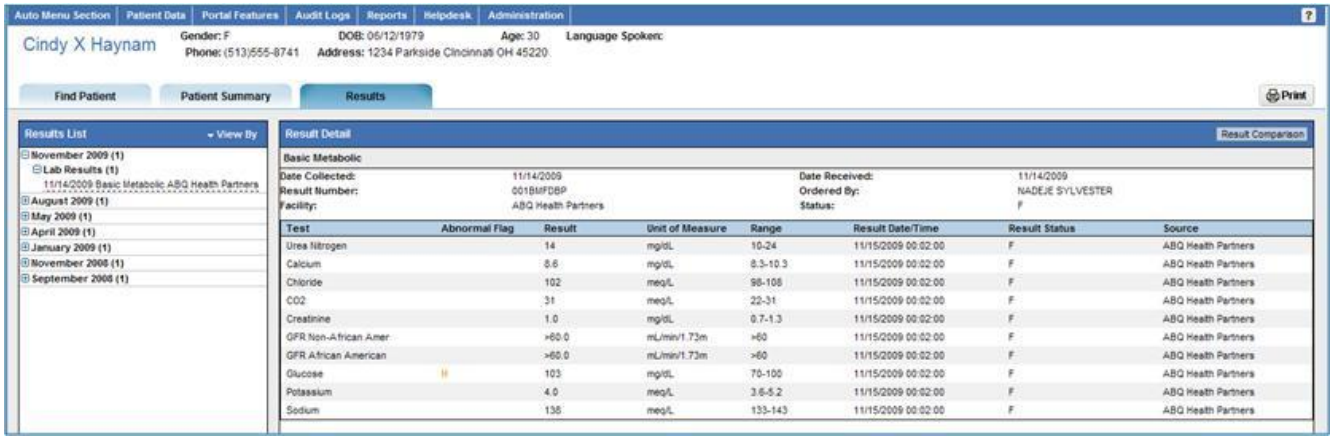
Sources of Support (5 of 7) View All

Name	Type	Source
SAMUEL, RICARDO	Next Of Kin	ABQ Health Partners
SAMUEL, RICARDO1	Next Of Kin	ABQ Health Partners
SAMUEL, RICARDO2	Next Of Kin	ABQ Health Partners
SAMUEL, RICARDO3	Next Of Kin	ABQ Health Partners
HUDSON, AMY	Guarantor	ABQ Health Partners

Immunizations (0 of 0)

Immunization Description	Immunization Date	Compliance Record	Source
No immunizations were found.			

Figure 10. Procedures, Payors, Sources of Support and Immunizations



Auto Menu Section | Patient Data | Portal Features | Audit Logs | Reports | Helpdesk | Administration

Cindy X Haynam
Gender: F DOB: 06/12/1979 Age: 30 Language Spoken:
Phone: (513)555-8741 Address: 1234 Parkside Cincinnati OH 45220

Find Patient | Patient Summary | Results | Print

Results List — View By
- November 2009 (1)
  - Lab Results (1)
    - 11/14/2009 Basic Metabolic ABQ Health Partners
- August 2009 (1)
- May 2009 (1)
- April 2009 (1)
- January 2009 (1)
- November 2008 (1)
- September 2008 (1)

Result Detail — Result Comparison

Basic Metabolic

Date Collected: 11/14/2009 Date Received: 11/14/2009
Result Number: 001BMFDBP Ordered By: NADEJE SYLVESTER
Facility: ABQ Health Partners Status: F

Test	Abnormal Flag	Result	Unit of Measure	Range	Result Date/Time	Result Status	Source
Urea Nitrogen		14	mg/dL	10-24	11/15/2009 00:02:00	F	ABQ Health Partners
Calcium		8.6	mg/dL	8.3-10.3	11/15/2009 00:02:00	F	ABQ Health Partners
Chloride		102	meq/L	98-108	11/15/2009 00:02:00	F	ABQ Health Partners
CO2		31	meq/L	22-31	11/15/2009 00:02:00	F	ABQ Health Partners
Creatinine		1.0	mg/dL	0.7-1.3	11/15/2009 00:02:00	F	ABQ Health Partners
GFR Non-African Amer		>60.0	mL/min/1.73m	>60	11/15/2009 00:02:00	F	ABQ Health Partners
GFR African American		>60.0	mL/min/1.73m	>60	11/15/2009 00:02:00	F	ABQ Health Partners
Glucose	H	103	mg/dL	70-100	11/15/2009 00:02:00	F	ABQ Health Partners
Potassium		4.0	meq/L	3.6-5.2	11/15/2009 00:02:00	F	ABQ Health Partners
Sodium		138	meq/L	133-143	11/15/2009 00:02:00	F	ABQ Health Partners

Figure 11. Detail of Lab Results

4. Core Requirements

The HIE core components are as follows:

1. **Master Patient Index (MPI)**. Used to link specific patients to specific data. Includes a Record Locator Service (RLS) and mismatch reconciliation processes. This component must allow human intervention to manage possible duplication and may create a system assigned Universal Patient Identifier (UPI) used internally.

Master Patient Index

MedPlus incorporates the Initiate MPI into our core product. We will provide the option to pre-populate demographic information as part of our implementation process. Our standard process for a Centergy implementation typically includes the pre-loading of patient demographic and ADT data to build the EMPI. We will perform this for SHARE while also providing the option to write customized rules or options for programs with protected data or specific circumstances. The functionality to

accomplish this is contained within the Initiate EMPI/RLS component of the MedPlus Centergy solution.

Since the product deploys a federated model there are no limitations on the EMPI/RLS' ability to scale within a community. To add an additional facility to the community, attaching it to an existing edge deployment or deploying a new edge server and configuring the interfaces is all that is required.

The matching algorithm best suited for SHARE is the probabilistic matching algorithm available through the Initiate Systems EMPI. This EMPI is the product of choice integrated into Centergy. The algorithm works in stages:

- First, standardized data is scrubbed, formatted and derived into a comparison string.
- Second, the information is put into buckets. Bucketing candidates are selected for comparison and assigned a Bucket Hash number.
- Third, the comparison members are compared at the attribute-by-attribute level and scored.

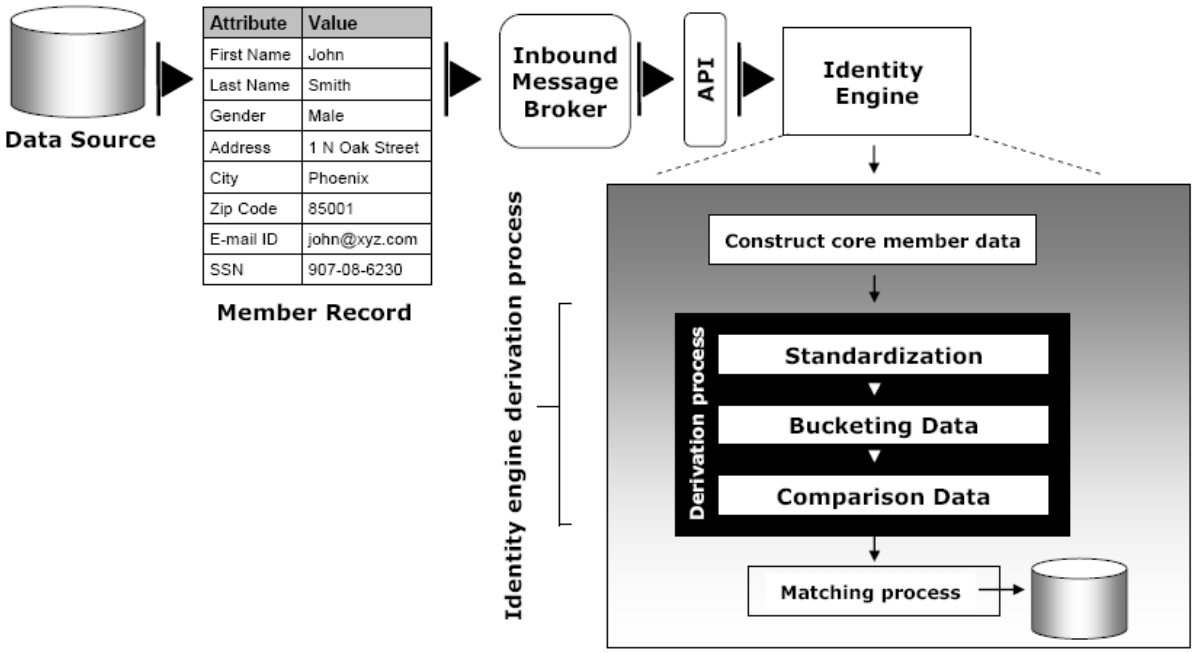


Figure 12. MPI Data Flow

The MedPlus Professional Services organization will work with SHARE to tune the MPI for the best patient search and record locator response by establishing matching thresholds that best meet the exchanges current and future requirements. MPI tuning is not an everyday occurrence but we are prepared to support SHARE initial implementation tuning as well as any fine tuning over time as the community grows.

The ability of the MPI to reduce duplication and its ongoing evaluation of records during searches and data loading requires little manual intervention to the system. SHARE will be able to decide over time how much FTE presence is needed to oversee the MPI effort , and will be able to utilize MedPlus professional services to assist them or manage this process for them as desired.

The MedPlus Centergy solution provides de-duplication services during the creation of the EMPI. Once the EMPI has been established, the system will evaluate all incoming information to determine if a record already exists for that individual. This prevents future duplicates from being created. The Initiate Systems EMPI solution that MedPlus proposes for the RLS is designed to create a single EMPI from disparate systems and data sources.

2. **Data Dictionary and Vocabulary Standardization**. Needed to create a standards-based "data normalization" process for diseases, lab results, diagnosis, and decision support.

Data Dictionary and Vocabulary Standardization

The Centergy product, as part of the 2010.3 release, will expand the products current data dictionary and vocabulary standardization capabilities to incorporate full data normalization and vocabulary translation engine for but not limited to the following vocabularies:

- SNOMED CT
- ICD-9 CM
- ICD-10
- LOINC
- NDC
- MS-DRG
- HCPCS
- RxNorm

The product will be able to support mapping local codes of particular facilities into a standard vocabulary; this will benefit the mapping of clinical terms as well as local lab codes to LONIC standards.

3. **Provider Index and Directory**. Used to identify and locate providers (doctors and other providers) based on National Provider Identifier (NPI) validation.

Provider Index and Directory

MedPlus proposes that SHARE utilize our National Provider Registry which is used today to support the business of Quest Diagnostics. MedPlus has created this directory to facilitate the delivery of eReferrals, clinical results and transcribed documents to over 150,000 physicians through our EHR product, Care360, as well as third party EMRs. By leveraging this solution as a starting point, we are able to segment the physician population by community, as we would to in Arkansas. Through our partnership with SureScripts, we are now integrating their provider registry as well as our own into our Centergy DEX Services platform so they can be used by third parties. SHARE can access this registry through a subscription-based model. Any Arkansas physicians who are not currently a part of any registry will be able to register directly through the SHARE community and participate.

The MedPlus Physician directory will support a plurality of identifiers, and will include the NPI. Through our work with the ONC, fiscally our participation in the NHIN Direct effort, we will fully support national standards as they unfold. We also recognize that our physician registry will have to support other local and community identifiers to ensure that we can cross-reference the national identifier with those from other jurisdictions.

Each provider should have basic information stored; MedPlus is participating with the IHE Healthcare Provider Directory (HPD) profile proposal review and is in agreement with the stated information detail in the draft proposal that is currently out for public comment. There should be some type of unique physician identifier, along with basic provider demographic information along with area of specialization and NPI, DEA, or state identifiers assigned to the provider. In addition, basic EMR and routing information should also be included to allow for message delivery, referrals and the routing of various clinical data types and documents.

Our solution can link physicians to organizations such as hospitals, practices and affiliations at the metadata level (again based upon the IHE HPD standard). All of our matching uses a match link process which allows different records of the same physician to be tied to a common virtual record. This same methodology allows other types of linkages, such as physicians within the same practice to be tied together.

The registry supports multiple office locations associated with a single provider. Primary location can be identified through physician attestation (as one of the data fields provided by the updates) or through simple heuristics. MedPlus would like to work with SHARE on identifying potentially more advanced heuristics to improve the "primary" designation capabilities when the source systems have not provided any guidance.

4. **Standards-based**. Utilizes standard communication protocols, nomenclature, and clinical terminology including, but not limited to, HL7 Clinical Document Architecture, SNOMED CT, and ICD-10. Other standards, or evolving standards, are:

   a. SOAP

   b. CCD – Continuity of Care Document

   c. XML, JSON, BSON

   d. DICOM

   e. LOINC

Standards-based

The MedPlus solution is a standards-based federated health information exchange system. Data from clinical applications is integrated into the Centergy solution in a number of ways, depending on the individual capability of each source application. The embedded InterSystems Ensemble Interface Engine helps make this integration process streamlined and efficient. Through this integration technology, additional HIE facility participants and new applications can be easily integrated into the SHARE using the following mechanisms:

- HL7 (v2.x with plans to support v3 in 2010), MLLP and TLS communication protocols
- CCR, or defined structured formats
- Varying levels of C32 documents
- XML, ebXML or defined formats
- DICOM
- SOAP
- APIs

- SQL queries directly to access and update data
- Implementing a Web services-based interface to existing systems, and then using the portal functionality to enable read-only access through a web browser (this is the leading solution for read-only documents and reports)
- Integrating a third-party Web-enabled application using the HTTP scripting engine
- NCPCP is a standard code set supported by the solution
- All traffic between federated nodes is encrypted by SSL and TLS

MedPlus is an active participant and member of the IHE IT infrastructure committee. Currently we are working towards successful participation in the 2011 IHE connection for the MedPlus solution. We are actively pursuing the IT infrastructure framework with the intent to support the use cases such as XDS.b, PIX, etc. We view successful implementation of the IT framework to be the underpinning for the supporting the other areas of IHE. Once we are certified and in compliance with the full IHE IT technology framework we will work with our customers to meet other desired areas such as Anatomic, Pathology, Cardiology, Eye Care, Patient Care Coordination, Patient Care Devices, Radiation Oncology and Radiology as the adopts the standards.

5. **Security.** User authentication, authorization, non-repudiation, encryption, and access control functionality, including audit logging.

Security

Centergy's security and access control is broken down into two broad services, **authentication** (i.e., is the user valid) and **authorization** (i.e., who can access what data). In terms of authentication, MedPlus provides a two-factor authentication scheme – username and password, as well as challenge phrase. The username and password will be validated against the MedPlus internal LDAP or against external systems such as Microsoft's Active Directory. Once authenticated, the user is passed to the MedPlus Access Service, which handles both authentication and authorization.

The following list is an overview of the security and role based authorization functions available in the MedPlus Clinical Portal/HIE solution:

- Role-based access to patient data
- Confidentiality for HIV and "VIP" patients
- Patient opt-out function
- User agreement form
- Patient/Physician Relationship Form
- Administrative functionality and audit reports
- User registration and management

Role-based Access to Patient Data

In many cases an HIE requires different functional and administrative requirements by user category. Centergy provides six recommended user classes that will support the majority of requirements. These user classes are listed below and are described in greater detail in the following sections of this document:

- Member Physicians (Credentialed physicians - HIE constituents)
- External Physicians (Physicians from other groups, community facilities, and/or physicians not credentialed by the HIE)
- Proxy User (Clinical office staff)
- Non-Standard Clinical User (Inpatient nursing staff)
- Clinical Super-User (Potentially ED physicians)
- Non-Clinical User (Other HIE allowed user)

Member Physicians

Member physicians are defined as clinical users who are associated directly with one of the Centergy solution constituents. If leveraged by the system, users in this class could be required to "declare" an association/relationship with the patient chosen to be viewed.

External Physicians

External physicians are defined as clinical users who are do not associate directly with one of the Centergy solution constituents. This could include physicians from other groups, community facilities, and physicians not credentialed by the system. We strongly recommend that users in this class require an association between the physician and patient to view data. This group is defined separately to allow different access policies to be applied to external physicians.

Proxy Users

Proxy users are defined as users who do not themselves have an association with a patient or patients and do not have rights to directly access patient data. This may include clinical office staff. Users in this class would require an association between themselves and a physician to view data. Based on the established physician association, proxy users would inherit access to patients based on the data access rights of the physician as described above.

Non-Standard Clinical Users

Non-standard clinical users do not rely on the patient-physician or patient-physician-proxy relationship model described above. Instead, these users rely on the facility which the patient was treated at and the status of the patient. This would include the nursing staff who would be allowed to view any patient's data within a facility or group of facility locations while the patient remained a patient.

Clinical Super-Users

Clinical super-users do not rely on the patient-physician or patient-physician-proxy relationship model described above. Instead, these users rely only on the facility which the patient was treated.

Non-Clinical Users

Non-clinical users would include all users with rights to access portal functionality, but no access to clinical data.

Data Encryption

Encryption is managed via HTTPS with 128 bit SSL encryption within the MedPlus solution. Authentication is managed at the application layer via unique user names and passwords. The application manages the user's access to various application components and associated configurable user group privileges.

Security is layered throughout the application deployment. It is first implemented by ensuring security at the network and operating system layers. This is a combination of network architecture and also policies and procedures at the systems and facilities levels. Inside the applications there is also a layering whereas all client communications is done only after a properly authenticated session is established of a secure channel. The application tiers also enforce security authorization checks not only at the user interface level but also just as importantly at the application and database tiers. The systems are designed to guard against even valid user credentials being used to access data not normally accessible by that end user. Care is taken to ensure that rogue client requests from a valid user still cannot access data not authorized for that user. Our product primarily supports TLS. Other encryption techniques, such WS-Security are applied as required. Security is administered by professional services or delegated administration through system security configuration functions.

ATNA Logging

The MedPlus Centergy product suite is maintaining pace with both the NHIN and IHE reference to ATNA security and audit compliance. All medical record access is stored in an ATNA compliant log at both the facility level and the centralized back office level. Our product roadmap includes full ATNA compliance in our 2010.2 release in August. The logs will be centralized and extensive reporting capabilities are planned extending our current reporting model to meet ATNA compliance.

Our Centergy product suite currently gives the HIE Administration role the ability to report on administration activity as well as user access, all transactions have a recorded time stamp. All transactions both successful and unsuccessful are recorded and reported. By becoming ATNA complaint in our August release (2010.2), we will be able to trace a transaction through from user access, to facility data retrieval.

Non-repudiation

Our Centergy product suite is a hybrid federated architecture employing a central back office consisting of a Web server enterprise service bus, a policy and security server, the central data server, the MPI/RLS server and the federated facility edge servers relies on an implied trust model to ensure high-levels of non-repudiation. While the system does not employ individual digital signatures we do employ digital certificates through authorized certificate authority. Reliance on the data from the hospital/facility information systems and importing that authorized data into the facility edge servers ensures high levels of non-repudiation throughout the system.

Once a user has been authenticated by our two-factor authentication, their role and patient consent is established for the desired data then the underlying security protocols ensure that data is received and transmitted only by authorized and properly configure edge servers in our architecture model. Verification is inherent in the security and data transmission protocols used by the system, if by VPN or by two-way TLS requiring both the sending and receiving entity to have a valid certificate information protection is ensured. The exact record is reconstructed based on the original HL7 ADT data feed from the authorized hospital/facility Clinical Information system. The facility edge server will interface and collect the data via the HL7 feed ensuring that the original source of the data is accurate and exact.

6. **Flexible.** Ability to complete any current and future required HIE competencies.

Flexible

MedPlus is committed to current and future standards directions set forth by ONC, HITSP, NHIN, IHE, and others as they apply to the support of healthcare information exchange at the community level. Our strong participation in the current NHIN Direct effort headed by the White House CIO is evident of our commitment to maintaining a flexible and extensible technology solution architecture underlying the Centergy product.

C. Other Features (RFI 5.3)

In addition to the above, are there any other features, services, or options that SHARE should consider? If so, please describe the feature, service, product, or option, and explain how it would support the HIE functionality as described in this RFI.

We are currently in discussions with a number of states relating to establishment of a Centergy Clinical Hub subscription model which would enable access to universal laboratory ordering and results delivery functionality as well as EMR capability for providers lacking this functionality today. This model is of particular interest to those states with significant Medicaid populations. As noted earlier, Centergy is capable of incorporating Clinical Hub data into a state HIE deployment which enriches the utility and actionability of data accessed via a provider portal. We will welcome the opportunity to further discuss this unique differentiator service as a potential extension to the current ARHIE scope and as it may relate to your MMIS integration roadmap.